

**WHAT IS CLAIMED IS:**

1. A solid structure, comprising:
  - a substrate; and
  - a layer being located on a surface of the substrate and including crystalline or polycrystalline MgB<sub>2</sub>.
2. The structure of claim 1, wherein the layer has a thickness of less than about 1 micron.
- 10 3. The structure of claim 1, wherein the substrate is crystalline or polycrystalline and projections along the surface of corresponding lattice constants of the layer and the substrate match to within ten percent.
- 15 4. The structure of claim 1, wherein the substrate is crystalline or polycrystalline and projections along the surface of corresponding lattice constants of the layer and the substrate match to within about one percent.
- 20 5. The structure of claim 1, wherein the substrate comprises one of SiC, LaAlO<sub>3</sub>, SiO<sub>2</sub>, SrTiO<sub>3</sub>, and sapphire.
- 25 6. The structure of claim 1, wherein the substrate is crystalline or polycrystalline adjacent the surface.
7. The structure of claim 1, wherein the layer forms a ring structure broken by two junction regions.
- 30 8. A process for making a structure, comprising:
  - providing a solid body of MgB<sub>2</sub>;
  - ejecting MgB<sub>2</sub> from the body by directing laser light onto the body; and
  - growing a layer on a surface of a substrate from a portion of the ejected MgB<sub>2</sub>.

9. The process of claim 8, wherein the substrate and MgB<sub>2</sub> have lattice constants along the surface that match to at least 10 percent.

10. The process of claim 8, further comprising forming the solid body by  
5 sintering MgB<sub>2</sub>.

11. The process of claim 8, wherein the ejecting includes directing light from a pulsed laser onto the body.

10 12. The process of claim 8, wherein the substrate comprises one of SiC, LaAlO<sub>3</sub>, SiO<sub>2</sub>, SrTiO<sub>3</sub>, and sapphire.

13. The process of claim 8, wherein the ejecting and growing are performed in a vacuum chamber that is maintained at a pressure of less than about 10<sup>-2</sup> Torr.

15 14. The process of claim 14, wherein the ejecting and growing are performed in a vacuum chamber that is maintained at a pressure of greater than about 10<sup>-6</sup> Torr.

20 15. The process of claim 13, wherein the growing produces a crystalline or polycrystalline layer of MgB<sub>2</sub> whose thickness is at least 10 nm.